

General Specifications

GD80, GD802G Gas Density Meter

GS 11T04A01-01EN

■ Overview

The Gas Density Meter is an instrument that continuously measures gas density and consists of the GD80 detector and the GD802G converter.

Based on the measured gas density, it can also measure specific gravity, molecular weight, gas concentration, hydrogen purity, and replacement concentration.

■ Features

Yokogawa Multi-mode Oscillation Technology

- Measures gas density, specific gravity, molecular weight, and concentration
- Fast response with a simple and robust sensor design
- Excellent stability with minimal drift caused by contaminants
- Easy sensor cleaning and restoration for reduced maintenance

Intuitive Operation

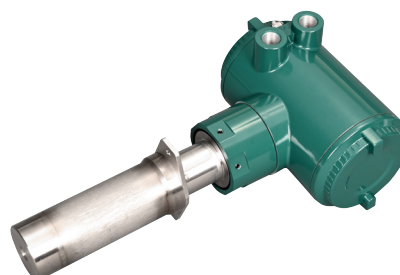
Easy setup and status monitoring via a color touchscreen interface.

Enhanced Noise Immunity

Digital signal transmission between the detector and converter minimizes the effects of electrical noise.

Open Connectivity

Supports Modbus TCP/IP (Ethernet) and Modbus RTU (RS485) communications.



GD80 Gas Density Meter Detector



GD802G Gas Density Meter Converter

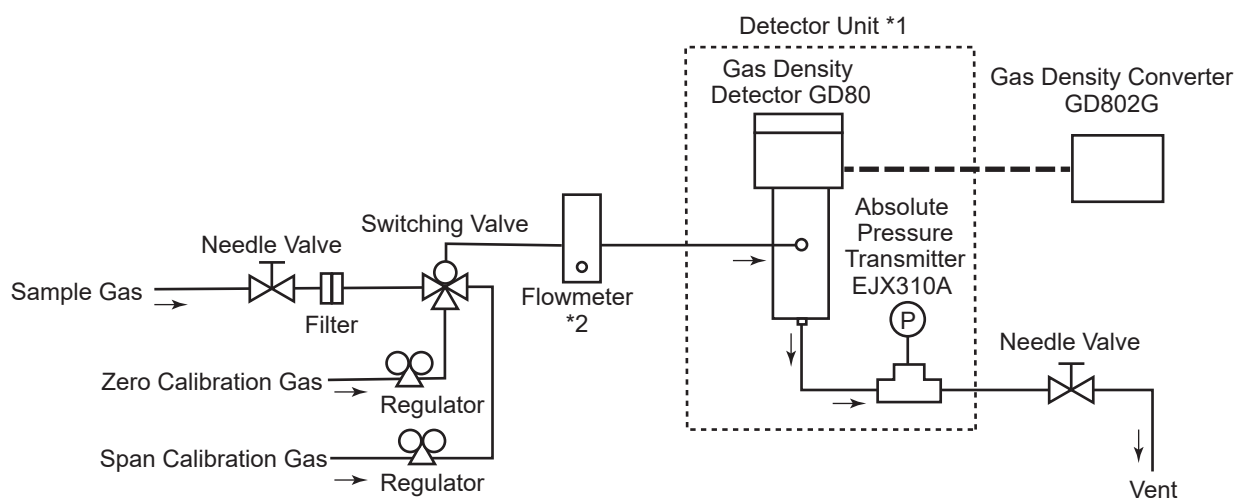
All company and product names mentioned in this document are trademarks or registered trademarks of their respective companies.

Please select appropriate equipment in accordance with the laws and regulations of the relevant country/region, when it is used in a location where explosive atmospheres may be present.

■ System Configuration

Typical system configurations for each measurement item are shown below.

● Example of a System Configuration for Gas Density Measurement

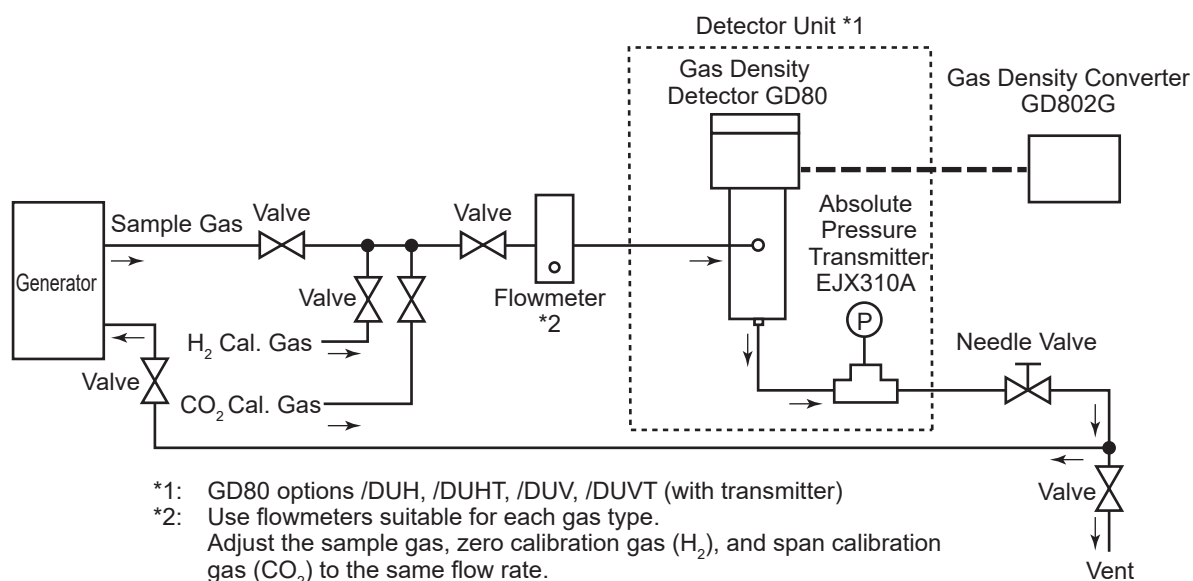


*1: GD80 options /DUH, /DUHT, /DUV, /DUVT (with transmitter)

*2: Use flowmeters suitable for each gas type.

Adjust the sample gas, zero calibration gas, and span calibration gas to the same flow rate.

● Example of a System Configuration for Hydrogen Purity / Replacement Concentration Measurement



*1: GD80 options /DUH, /DUHT, /DUV, /DUVT (with transmitter)

*2: Use flowmeters suitable for each gas type.

Adjust the sample gas, zero calibration gas (H₂), and span calibration gas (CO₂) to the same flow rate.

■ Common Specifications

Measurement Items: The measurement items available for each measurement model are shown in the table below.

Model Item	Density Meter *1	Hydrogen Purity Meter	Replacement Meter	Hydrogen Purity / Replacement Meter	Calorimeter *2
Actual Density	Y	Y	Y	Y	Y
Corrected Density	Y	Y	Y	Y	Y
Specific Gravity	Y	—	—	—	—
Molecular Weight	Y	—	—	—	—
Concentration	Y	—	—	—	—
H ₂ Concentration in Air	—	Y	—	Y	—
H ₂ Concentration in CO ₂	—	—	Y	Y	—
Air Concentration in CO ₂	—	—	Y	Y	—
Calorific Value	—	—	—	—	Y

(Y: Available, —: Not available)

Note: Density is the primary measurement. All other displayed values are calculated from the measured density.

*1: To use the instrument as a density meter, select Measurement “-A” for the GD80.

*2: Contact Yokogawa for use as a calorimeter

Calibration: Manual calibration

Digital Communication:

Ethernet (Modbus TCP/IP)

RS485 (Modbus RTU)

Sample Gas Conditions:

Sample Gas:

Applicable to all gases except highly corrosive gases. Contact Yokogawa for details.

Temperature: -10 to 60°C (No condensation)

Pressure: 50 to 600 kPa abs.

Flow Rate: 0.1 to 1 L/min

Recommended Cables:

Between Detector and Converter:

Power Cable:

2-core shielded cable

Maximum cable length: 500 m

Loop resistance: 25 Ω or less

Rated voltage: 30 V AC or higher

Ground the shield on the converter side

RS485 Communication Cable:

2-core shielded cable

Maximum cable length: 500 m

Ground the shield on the converter side

Between Detector and Pressure Transmitter:

Install the wiring in accordance with EN 60079-14 and applicable local regulations.

Maximum cable length: 2.9 m

Loop resistance: 2 Ω or less

Use a cable that complies with the intrinsic safety parameters of the pressure transmitter.

Installation Location:

Free from corrosive gases

Subject to minimal vibration

Not exposed to direct sunlight or radiant heat

Subject to minimal temperature gradients

and temperature fluctuations

Not exposed to prolonged high temperatures, high humidity, or low humidity

Warm-up Time:

Measurement accuracy is guaranteed after 30 minutes of warm-up.

• Performance Specifications

The following performance specifications apply when the detector and converter are used in combination with the Yokogawa-specified pressure transmitter, EJX310A Absolute Pressure Transmitter.

Measurement Model	Density Meter					Hydrogen Purity Meter	Replacement Meter		Calorimeter	
Item	Density kg/m ³	Density lb/ft ³ *6	Specific Gravity	Molecular Weight	Concentration vol%	H ₂ in Air vol%	H ₂ in CO ₂ vol%	Air in CO ₂ vol%	Calorific Value MJ/m ³ *1	Calorific Value kBTU/ft ³ *1*6
Range	0 to 6 (corrected) 0 to 60 (actual)	0 to 0.4 (corrected) 0 to 4 (actual)	0 to 5	0 to 140	0 to 100	85 to 100 *2	0 to 100	0 to 100	0 to 133	0 to 3.5
Minimum Range	0.1	0.01	0.1	4	Equivalent to 0.100 kg/m ³ density	—	—	—	Equivalent to 0.100 kg/m ³ density	
90% Response Time *3	Approx. 5 s					Approx. 5 s *7	Approx. 5 s *7		Approx. 5 s	
Linearity	±1%FS	±1%FS	±1%FS	±1%FS	±1	±1	±1	±1	±1%FS	
Repeatability	±0.001 or ±0.5%FS *4	±0.0001 or ±0.5%FS *4	±0.001 or ±0.5%FS *4	±0.02 or ±0.5%FS *4	±0.5 or concentration equivalent to ±0.001 kg/m ³ density *4	±0.5	±0.5	±0.5	±0.5% FS or calorific value equivalent to 0.001 kg/m ³ density *4	
Zero / Span Drift *5	±0.003/month	±0.002/month	±0.003/month	±0.07/month	Equivalent to ±0.003 kg/m ³ density/month	±0.5/month	±0.5/month	±0.5/month	Equivalent to ±0.003 kg/m ³ density/month	

*1: Contact Yokogawa when measuring calorific value.

*2: Configurable from 0 to 100 vol% (default: 85 to 100 vol%).

*3: Time required for the reading to reach 90% of its final value after the indicated value begins to change (at a gas flow rate of 0.6 L/min).

*4: Whichever is greater.

*5: Provided that the detector, converter, and pressure transmitter are not affected by ambient temperature.

*6: Unit conversion from kg/m³ to lb/ft³ and from MJ/m³ to kBTU/ft³ is supported by the GD802G.

*7: When switching from the zero point CO₂ to the span point H₂.

■ Specifications, Model and Suffix Codes and Dimensions

1. GD80 Gas Density Meter Detector

<Specifications>

Ambient Conditions:

Ambient Temperature: -10 to +60°C

Ambient Humidity: 5 to 95% RH (non-condensing)

Storage Temperature: -30 to +70°C

Mounting: Pipe mounting, wall mounting (when the Detector Unit is specified)

Construction:

Materials:

Probe: Stainless steel

Housing (Cover/Case): Aluminum alloy

Finish:

Housing (Cover/Case): Urethane coating

Color: Mint green

Degree of Protection:

Varies depending on the Type code.

-AC: TYPE 4X / NEMA 4X

Other than -AC: IP66

Weight: Approx. 8.5 kg (detector only)

Approx. 15.6 kg (with mounting plate and EJX310A)

Wetted Parts Material: SUS316, fluororubber

<Safety standard, EMC and RoHS>

Safety:

CE: EN 61010-1, EN IEC 61010-2-030

UL: UL 61010-1, UL 61010-2-030

CSA: CAN/CSA C22.2 No. 61010-1, CSA C22.2 No. 61010-2-030

GB: GB30439

Installation Altitude: Up to 2000 m

Installation Category (IEC 61010-1): I (Note)

Pollution Degree (IEC 61010-1): 2 (Note)

Note: Installation category, called overvoltage category, specifies impulse withstand voltage. Category I applies to equipment connected to circuits in which measures have been taken to limit transient overvoltages to a low level.

Pollution degree indicates the degree of existence of solid, liquid, gaseous, or other inclusions that reduce dielectric strength. Degree 2 is the normal indoor environment.

EMC:

CE: EN 61326-1, EN 61326-2-3, EN IEC 61326-1, EN IEC 61326-2-3: Class A, Table 2 (For use in industrial locations)

RCM: EN 61326-1 Class A, Group 1

KC: Korea Electromagnetic Conformity Standard

RoHS:

CE: EN IEC 63000 (Style 1.06 and later)

Other Environmental Regulations:

REACH: Regulation (EC) 1907/2006

<Model and Suffix Codes>

Model	Suffix code	Option code	Description
GD80	.....	.....	Gas Density Meter Detector
Type	-AA -AC -AF -AG -AJ	..... ..... ..... ..... .....	General purpose for CE (*1) General purpose for CSA General purpose for China (*1)(*2) General purpose for KC (*1) General purpose (*3)
Housing	-B	.....	Aluminum alloy cast + urethane coating
Connection Thread	-M -T	..... .....	M20 × 1.5 1/2 NPT
Measurement	-H -A	..... .....	H ₂ purity Density / H ₂ purity (Selectable)
Country (*4)	-N -J	..... .....	Global except Japan Japan
—	-N	.....	Always -N
—	-N	.....	Always -N
Options	Mounting Hardware	/PI	Pipe mounting hardware (*5)
	Cable Gland (*6)	/G4	Cable Gland 4 pcs (for General purpose)
	Tag	/SCT	Tag No. Laser-marked on the nameplate (*7)
	Detector on Mounting Plate	/DUH /DUHT /DUV /DUVT /DHM /DVM	With transmitter, Horizontal mounted (*8) With transmitter(+Tag), Horizontal mounted (*8) With transmitter, Vertical mounted (*8) With transmitter(+Tag), Vertical mounted (*8) Detector horizontal mounted on plate(*9) Detector vertical mounted on plate (*9)

(Note) Cable glands are not included with the product. Purchase them separately or select the appropriate option.

- *1: For Type “-AA”, “-AF”, “-AG”, options /DUH, /DUHT, /DUV, and /DUVT are not available.
The pressure transmitter must be ordered separately.
- *2: RCM-compliant
- *3: Select Type “-AJ” for use in Japan.
- *4: For use in Japan, select “-J”.
- *5: /PI cannot be specified together with /DUH, /DUHT, /DUV, /DUVT, /DHM, or /DVM.
- *6: A cable gland must be installed in the cable entry (M20 × 1.5).
- *7: The specified tag number is laser-marked on the nameplate. The maximum number of characters is 16.
- *8: The detector and pressure transmitter are mounted on a mounting plate and shipped as an assembled unit.
- *9: The detector is mounted on a mounting plate and shipped as an assembled unit.
The pressure transmitter is not included and must be procured separately.
Piping components between the detector and pressure transmitter are included.
Installation and piping of the pressure transmitter are the responsibility of the customer.

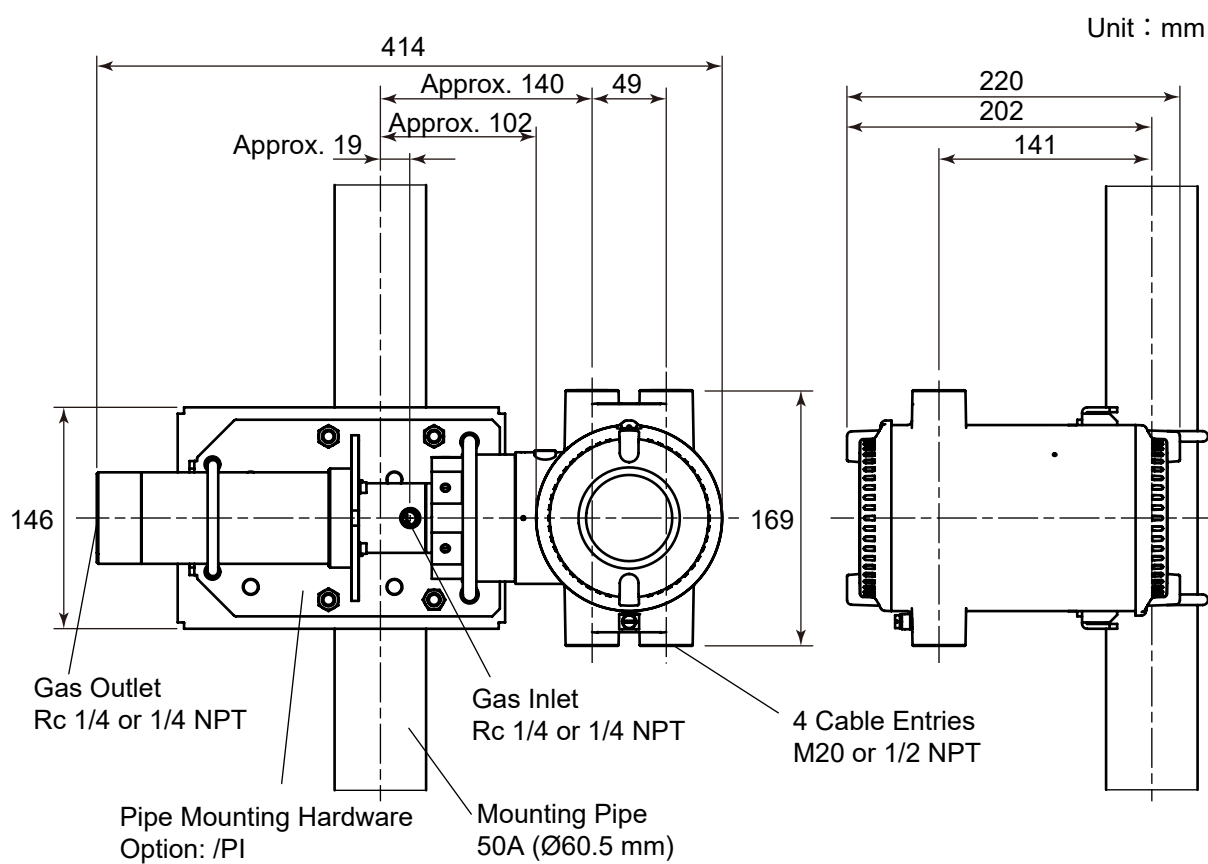
- **Standard Accessories**

One blind plug (for an unused cable entry)

<External Dimensions>

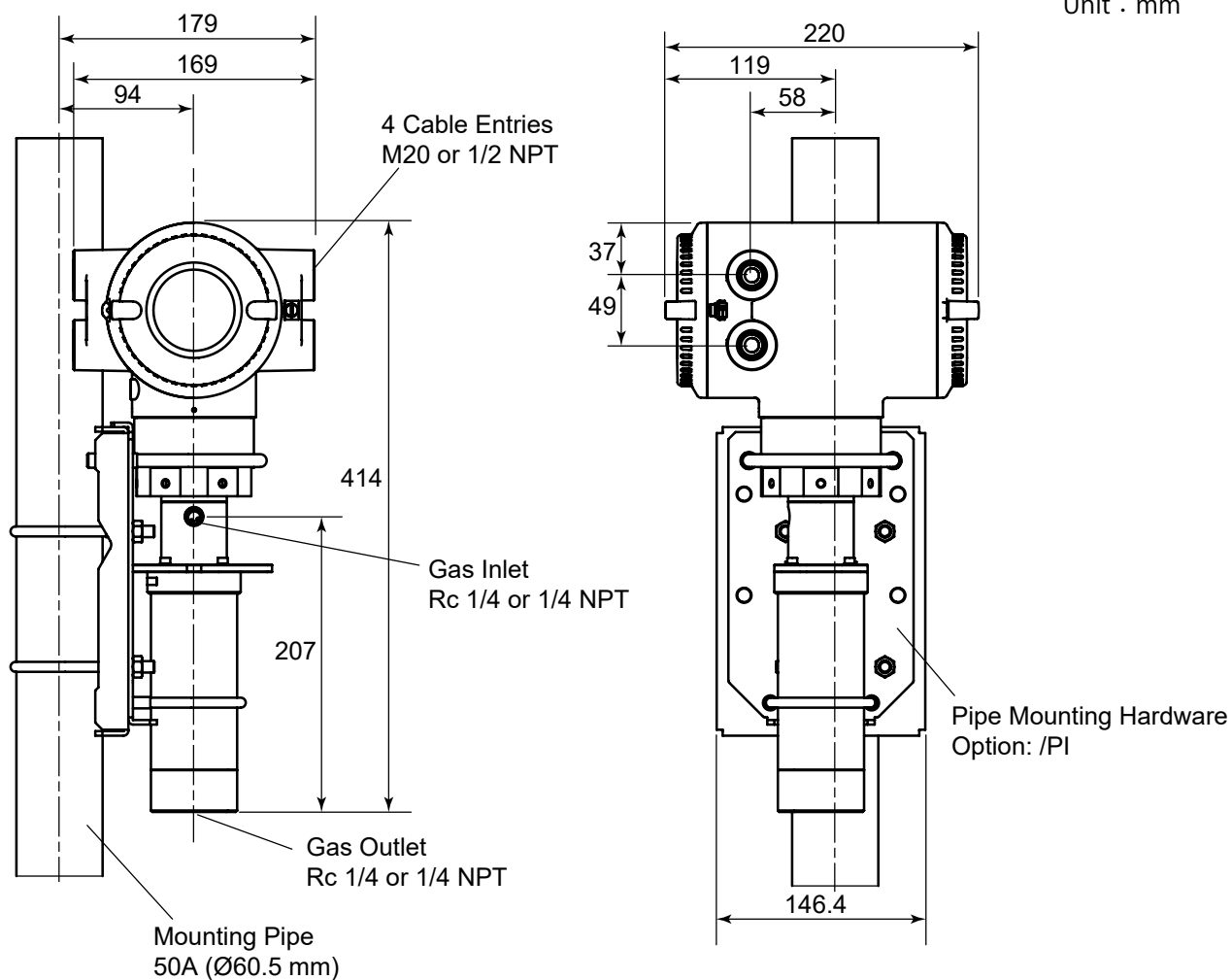
- **Horizontal Mounting with Pipe Mounting Hardware (/PI)**

Installation is possible in either direction.



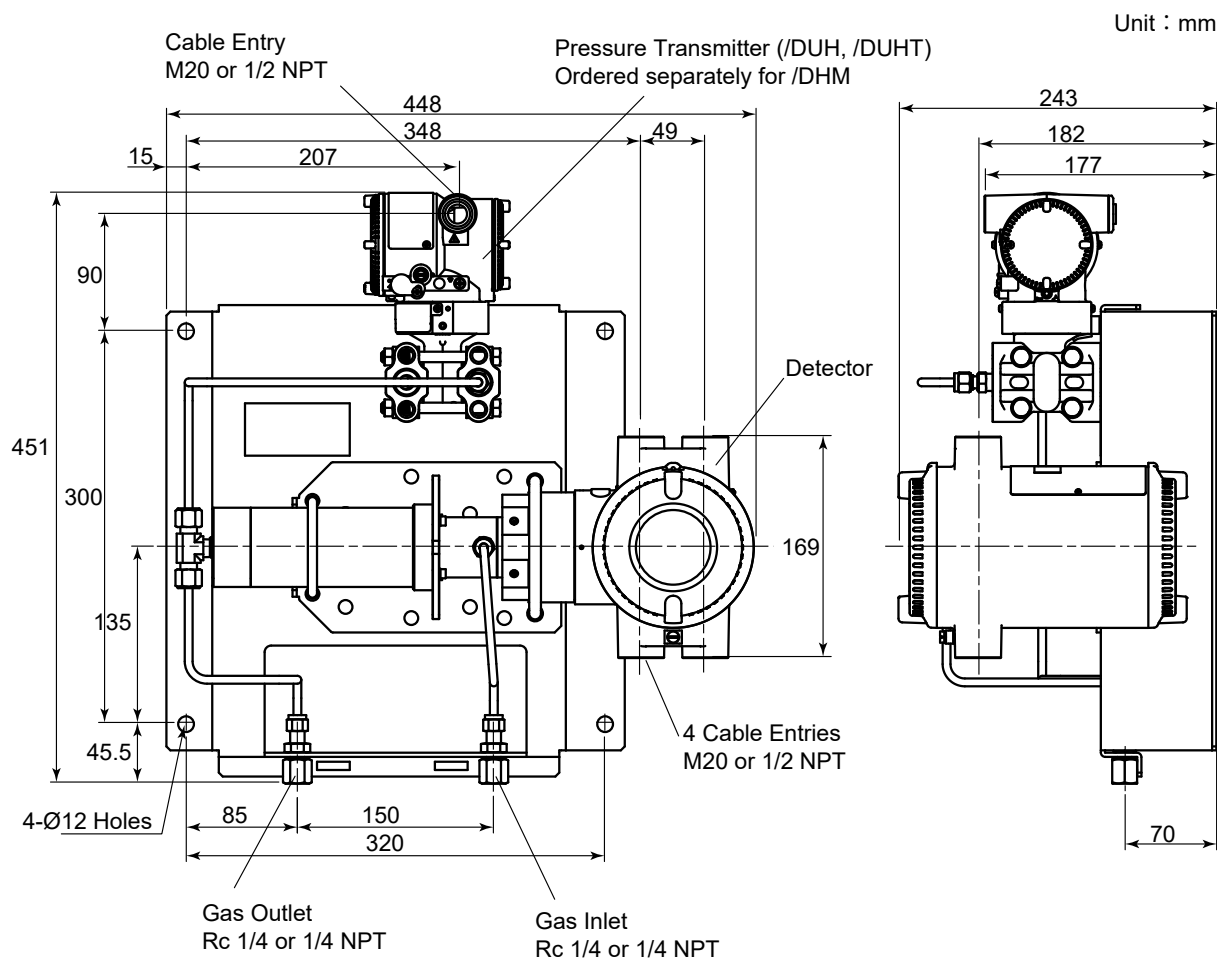
- Vertical Mounting with Pipe Mounting Hardware (/PI)

Unit : mm



- **Detector on Mounting Plate, Horizontal Mounting (/DUH, /DUHT, /DHM*)**

*: For /DHM, only the detector is mounted on the mounting plate. The pressure transmitter must be ordered separately.

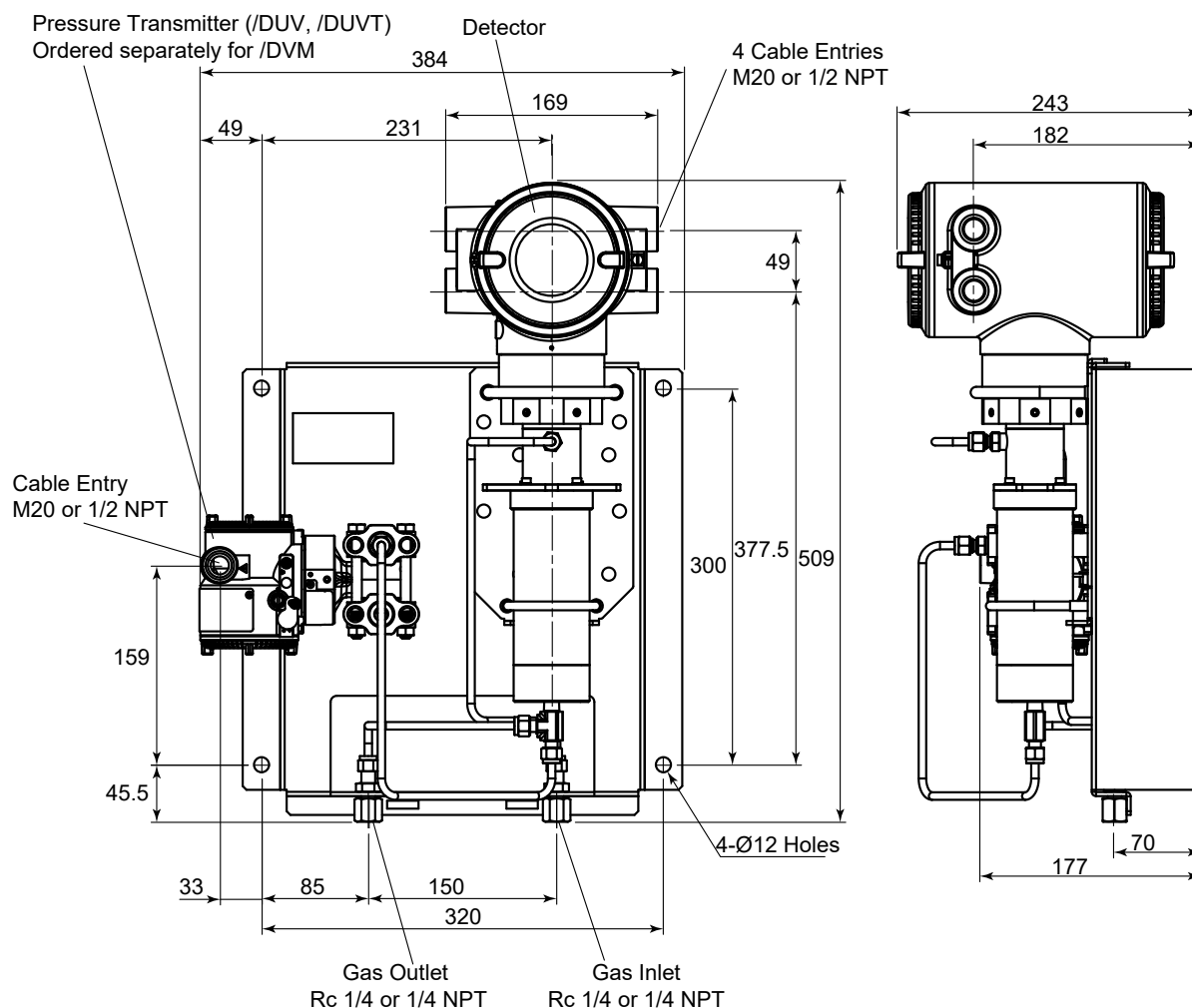


Note: Install the detector at a location capable of supporting the total weight of the detector mounted on the mounting plate (approx. 15.6 kg), cable glands, cables, and other associated components.

- **Detector on Mounting Plate, Vertical Mounting (/DUV, /DUVT, /DVM*)**

*: For /DVM, only the detector is mounted on the mounting plate. The pressure transmitter must be ordered separately.

Unit : mm



Note: Install the detector at a location capable of supporting the total weight of the detector mounted on the mounting plate (approx. 15.6 kg), cable glands, cables, and other associated components.

< EJX310A Absolute Pressure Transmitter >

A pressure transmitter is required for pressure compensation. Yokogawa offers the EJX310A Absolute Pressure Transmitter.

When a transmitter-equipped detector unit is specified for the GD80, the EJX310A is included. For details, refer to page 16.

2. GD802G Gas Density Meter Converter

<Specifications>

Ambient Conditions:

Ambient Temperature: -10 to +55°C
 Ambient Humidity: 10 to 90% RH at 40°C
 (non-condensing)

Storage Temperature: -30 to +70°C

Mounting: Pipe, wall, or panel mounting

Power Supply:

Rated Voltage: 100 to 240 V AC
 Allowable Voltage Range: 90 to 264 V AC
 Rated Frequency: 50/60 Hz
 Allowable Frequency Range: 50 Hz $\pm 5\%$, 60 Hz $\pm 5\%$
 Power Consumption: 35 VA

Signal Output:

Number of Outputs: 2
 Isolated Output: 4 to 20 mA DC
 Maximum Load Resistance: 600 Ω

Contact Input/Output:

Contact Outputs: 4
 Contact Rating (resistive load):
 AC specifications: 100 VA, 250 VAC, 5 A
 (The product of Voltage by Current is
 100 VA or less.)
 DC specifications: 50 W, 50 VDC, 5 A
 (The product of Voltage by Current is
 50 W or less.)

Functions: Failure / Alarm / Fail-safe / Maintenance
 / Function (identifies whether the
 Hydrogen Purity Meter or Replacement
 Meter model is in use) / Range
 switching (identifies whether the H₂ in
 CO₂ or Air in CO₂ function is in use for
 the Replacement Meter)

Voltage-free Contact Input: 1
 When closed (short-circuited): 200 Ω max.
 When open: 100 k Ω min.
 Function: Used as a switching signal for the
 Replacement Meter.
 Contact closed: H₂ in CO₂ vol%
 Contact open: Air in CO₂ vol%

Construction:

Material: Aluminum alloy
 Finish: Urethane coating
 Color: Silver gray
 Window: Polycarbonate

Degree of Protection:

Varies depending on the Type code.

-AC: TYPE 4X / NEMA 4X
 Other than -AC: IP66

Weight: Approx. 3 kg (converter only)

Display:

Display Type: QVGA color LCD touchscreen
 Languages: English, Chinese, Japanese

<Safety standard, EMC, and RoHS>

Safety:

CE: EN 61010-1, EN IEC 61010-2-030
 UL: UL 61010-1, UL 61010-2-030
 CSA: CAN/CSA C22.2 No.61010-1,
 CSA C22.2 No.61010-2-030
 GB: GB30439

Installation Altitude: Up to 2000 m

Installation Category (IEC 61010-1): II (Note)

Pollution Degree (IEC 61010-1): 2 (Note)

Note: Installation category, called overvoltage category,
 specifies impulse withstand voltage. Category
 II applies to equipment supplied from a fixed
 installation.

Pollution degree indicates the degree of existence of
 solid, liquid, gaseous, or other inclusions that reduce
 dielectric strength. Degree 2 is the normal indoor
 environment.

EMC:

CE: EN 61326-1, EN 61326-2-3,
 EN IEC 61326-1, EN IEC 61326-2-3:
 Class A, Table 2 (For use in industrial
 locations),
 EN 61000-3-2, EN IEC 61000-3-2,
 EN 61000-3-3
 RCM: EN 61326-1 Class A, Group 1
 KC: Korea Electromagnetic Conformity
 Standard

RoHS:

CE: EN IEC 63000 (Style 1.06 and later)

Other Environmental Regulations:

REACH: Regulation (EC) 1907/2006

<Model and Suffix Codes>

Model	Suffix code	Option code	Description
GD802G	.....	.....	Gas Density Meter Converter
Type	-AA -AC -AF -AG -AJ	..... ..... ..... ..... .....	General purpose for CE General purpose for CSA General purpose for China (*1) General purpose for KC General purpose (*2)
Housing	-B	.....	Aluminum alloy cast + urethane coating
—	-NN	.....	Always -NN
Digital Communication	-N -E -R	..... ..... .....	Without Digital Communication Modbus TCP/IP (Ethernet) Modbus RTU (RS485)
Country (*3)	-N -J	..... .....	Global except Japan Japan
—	-N	.....	Always -N
—	-N	.....	Always -N
Options	Mounting Hardware	/UM /U /PM	Universal Mounting kit (*4) Pipe and wall mount hardware Panel mounting hardware
	Cable Gland	/G8 /GE8	Cable Gland 8 pcs (*5) Cable Gland 7 pcs + for Ethernet 1 pc (*5)(*6)
	Hood	/H	Sunshade hood, stainless steel
	Tag	/SCT	Tag No. Laser-marked on the nameplate (*7)
	Conduit Adapter (*8)	/CB4 /CD4 /CF4 /CB6 /CD6 /CF6	G1/2 × 4 pcs 1/2 NPT × 4 pcs M20 × 1.5 × 4 pcs G1/2 × 3 pcs + G1/2 for Ethernet × 1 pc (*6) 1/2 NPT × 3 pcs + 1/2 NPT for Ethernet × 1 pc (*6) M20 × 1.5 × 3 pcs + M20 × 1.5 for Ethernet × 1 pc (*6)

(Note) Cable glands are not included with the product. Be sure to install a cable gland (or conduit adapter) in the cable entry (M20 × 1.5). Purchase them separately or select the appropriate option.

*1: RCM-compliant

*2: For use in Japan, select “-AJ” as Type.

*3: When using the converter in Japan, select “-J” as Country. Only SI units (International System of Units) are supported.

*4: Universal mounting kit contains pipe, wall mounting hardware /U and panel mounting hardware /PM.

*5: Five rubber plugs for unused cable entries are included.

*6: Available only with Digital Communication “-E” (Modbus TCP/IP (Ethernet)) for Ethernet communication

*7: The specified Tag No. is laser-marked on the nameplate (max. 16 characters).

*8: Eight cable entries are provided. Refer to the table below and order additional cable glands as required. Unused cable entries must be fitted with a cable gland and rubber plug. Specify /G8.

Cable Entry	Power Supply	Detector	I/O (mA Output, Contact Input)	Relay (Contact Output)	Digital Communication		
Code	—	—	—	—	-N	-E	-R
Required Entries	1	2	1 or 2	0 or 1 or 2	0	1*	1

*: Dedicated cable gland (or conduit adapter) for Ethernet communication

- Standard Accessories**

One jumper (for termination resistor connection when Digital Communication “-R” is selected)

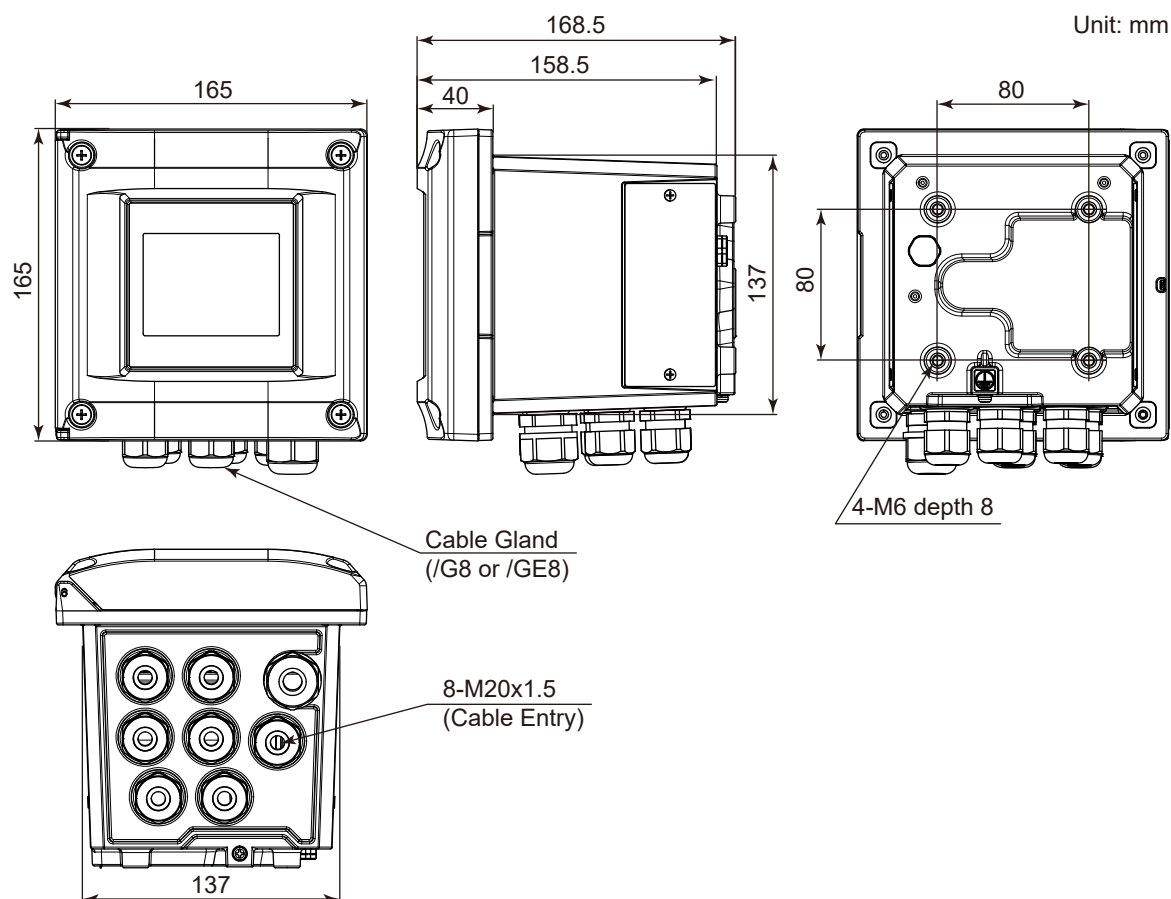
- Conduit Adapter for Additional Purchase**

Type	Part Number	Description
G1/2 (Cable Gland and Adapter)	K9703WF	For additional cable entries of option /CB□, 4 sets
1/2 NPT (Cable Gland and Adapter)	K9703WG	For additional cable entries of option /CD□, 4 sets
M20 × 1.5 (Cable Gland and Adapter)	K9703WH	For additional cable entries of option /CF□, 4 sets

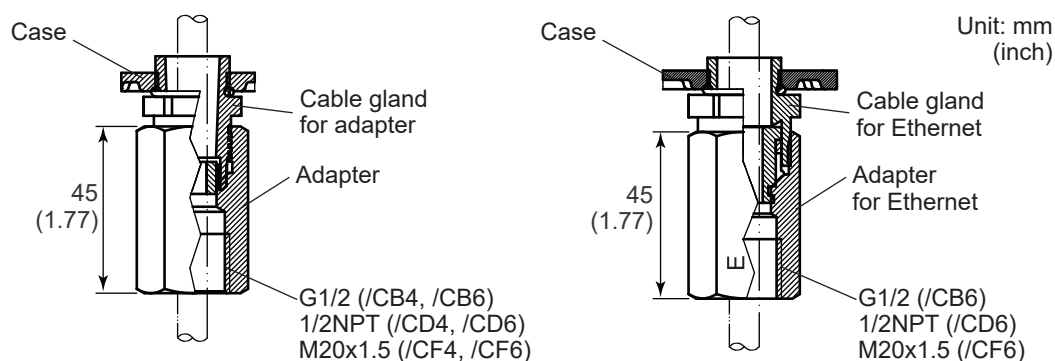
• Optional Accessories

Item		Part Number	Remarks
Mounting Hardware	Pipe/Wall Mounting Hardware (Stainless Steel)	K9703SS	Same as option /U
	Panel Mounting Hardware (Stainless Steel)	K9703ZD	Same as option /PM
Hood		K9698WK	Same as option /H
Rubber Plug		K9334CN	One plug for cable gland
Cable Gland		K9703PC	Same as option /G8 (8 Cable Glands and 5 rubber plugs)
		K9703PE	Same as option /GE8 (7 Cable Glands, 1 Cable Gland for Ethernet, and 5 rubber plugs)
Fuse		A1633EF	250 V, 2.5 A (minimum order quantity: 5 pcs)
SD Card		A1004NL	1 GB industrial SD card. Customer-supplied SD cards may also be used. Supported standards: SD, SDHC

<External Dimensions>

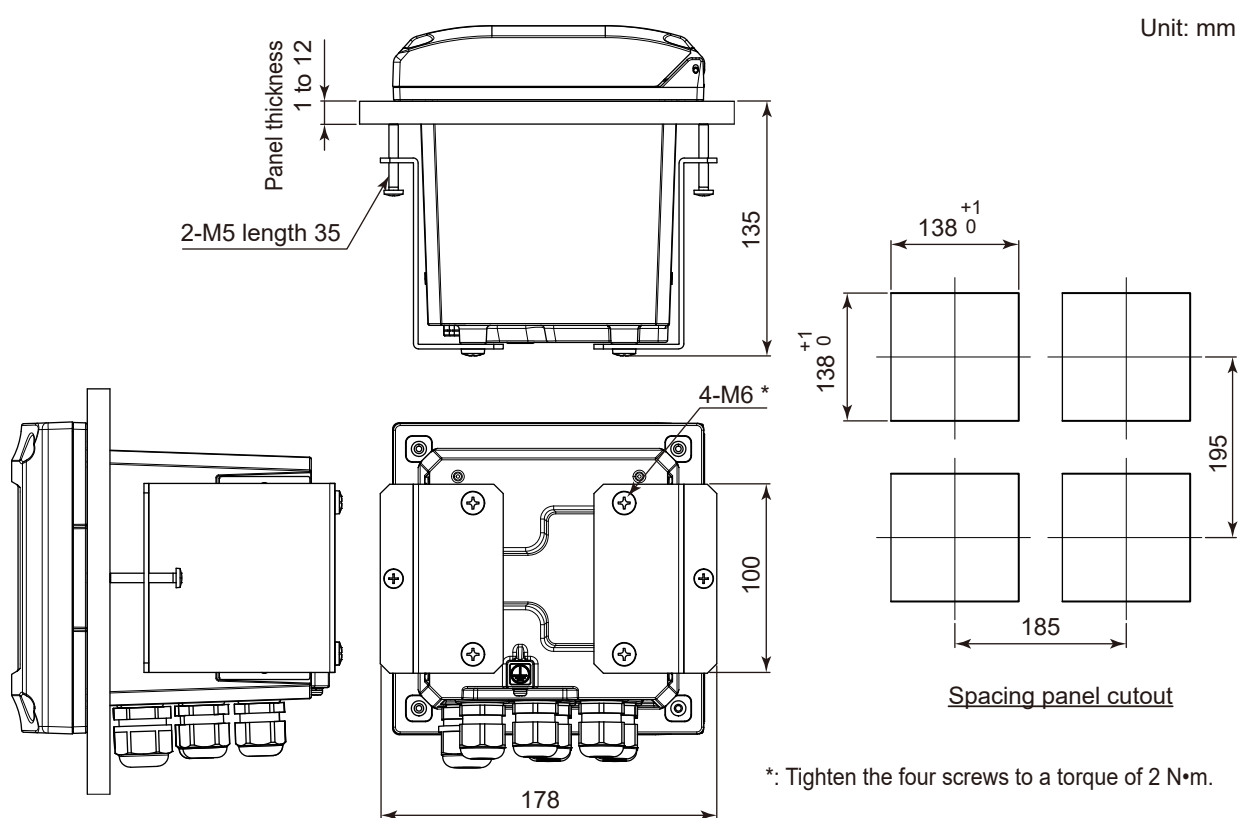


- Conduit Adapters (Options: /CB4, /CD4, /CF4, /CB6, /CD6, /CF6)

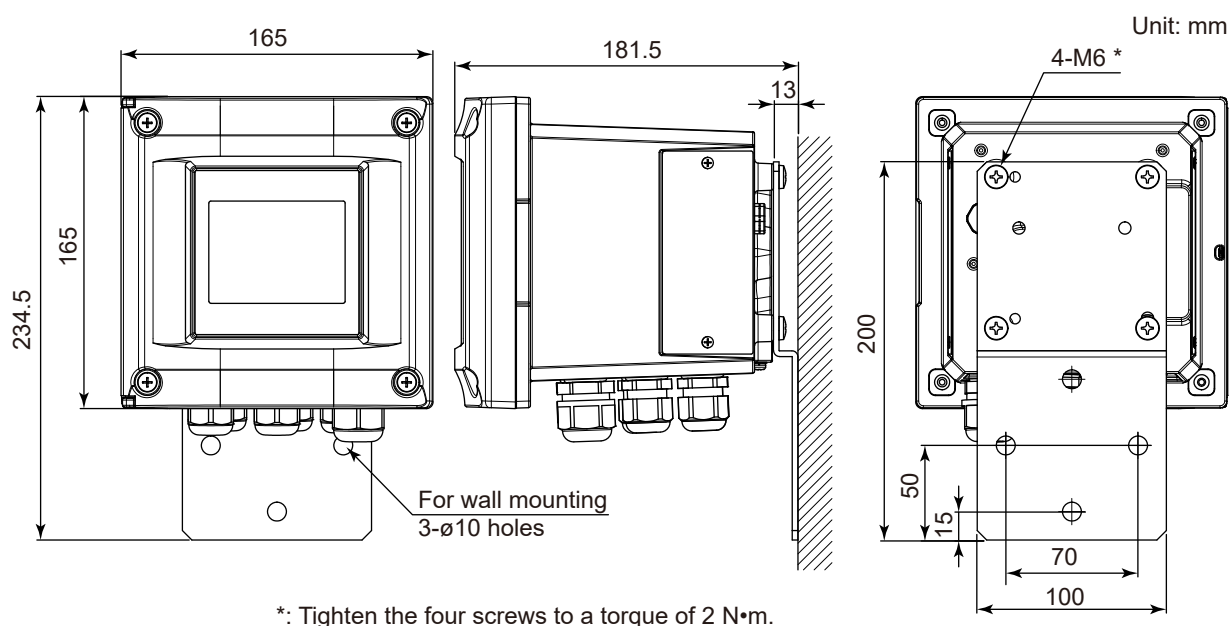


Note: The Universal Mounting kit (/UM) includes Pipe/Wall Mounting Hardware (/U) and Panel Mounting Hardware (/PM).

- Panel Mounting Hardware (/PM, /UM)

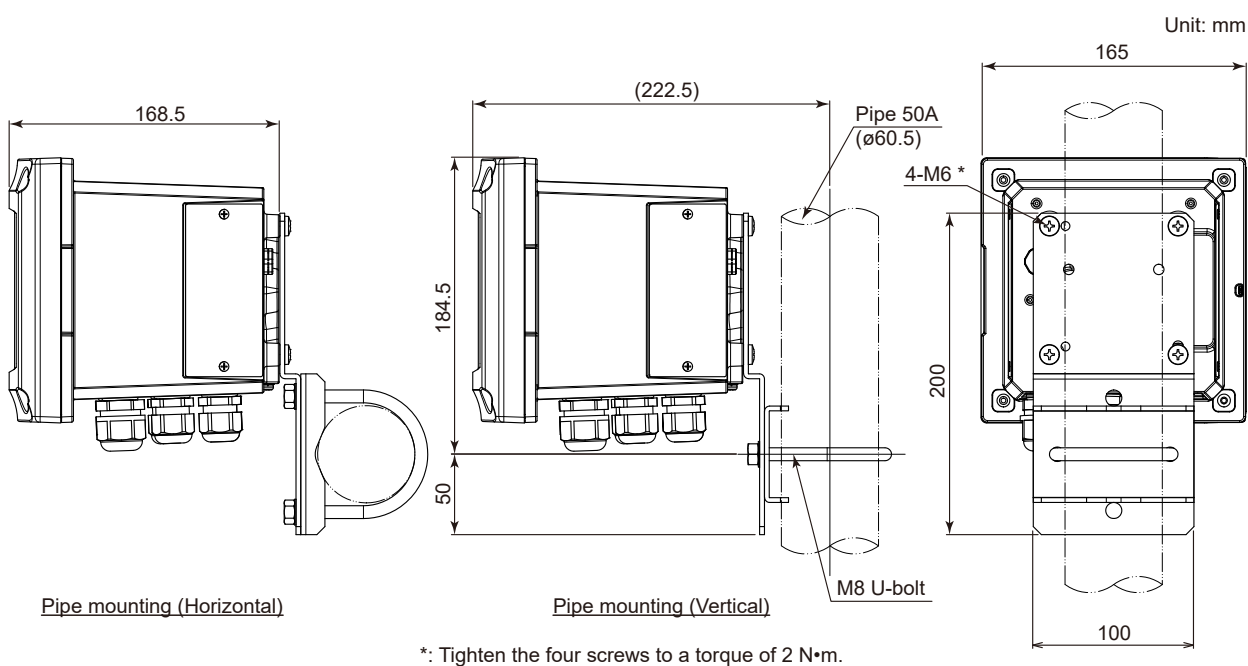


- **Wall Mounting Hardware (/U, /UM)**

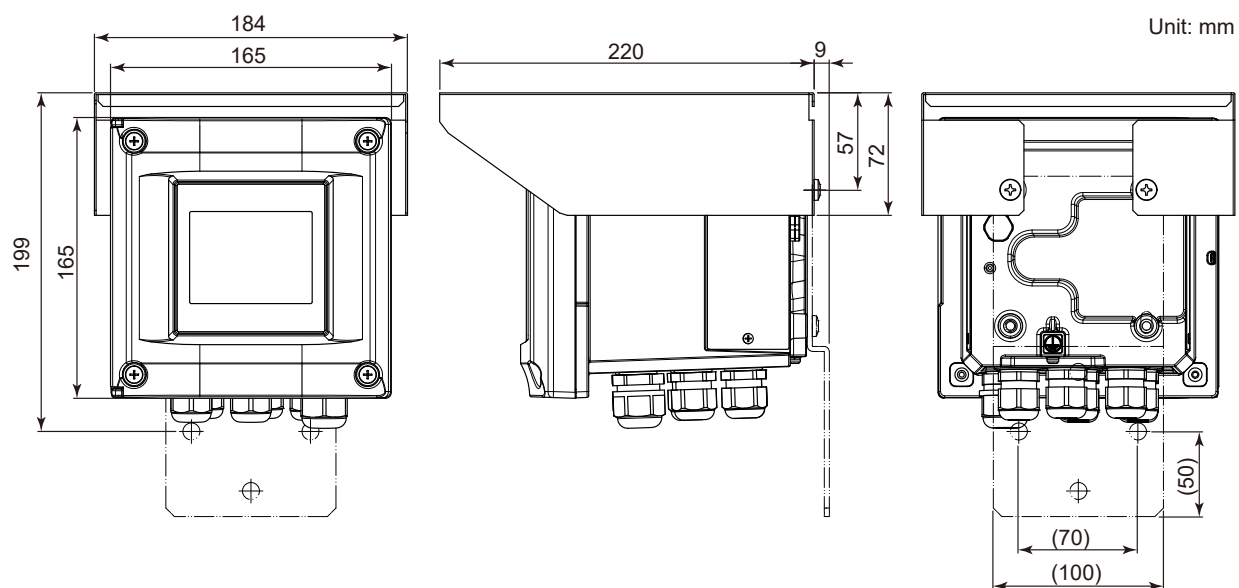


Note: Install the converter at a location capable of supporting the total weight, including the converter (approx. 3 kg), cable glands, and cables.

- **Pipe Mounting Hardware (/U, /UM)**



- Hood Stainless Steel (/H)



3. EJX310A Absolute Pressure Transmitter

Pressure measurement is required for pressure compensation. Yokogawa offers the EJX310A Absolute Pressure Transmitter for this purpose.

When a detector unit with transmitter is specified for the GD80, the EJX310A is supplied.

For some model and option combinations, a detector unit with transmitter cannot be selected. In such cases, specify a GD80 detector on mounting plate (/D□M) and order the pressure transmitter listed in the table below separately.

For details of the EJX310A, refer to GS 01C25D01-01EN.

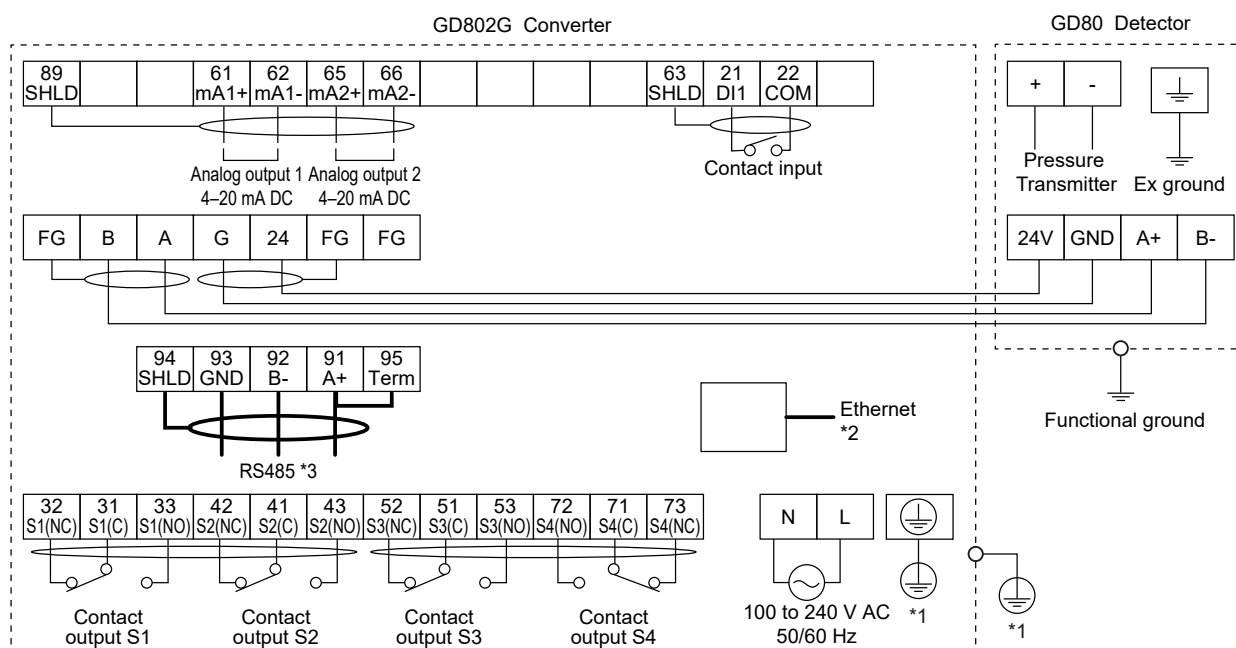
GD80 Codes			Applicable Model of EJX310A				
Type	Connection Thread	Tag No.	Model and Suffix Codes	Ordering Information for EJX310A			
				Range	Range Unit	Damping Time Constant	Tag No.
General purpose *1 (-A□)	M20 (-M)	N	EJX310A-EAS0J-819NN/K1/A/CA	0 to 600	kPa	0.2	N
		Y					Y
	1/2 NPT (-T)	N	EJX310A-EAS5J-817NN/K1/A/CA				N
		Y					Y

Y: Available, N: Not available

*1: Type "-AA" (General Purpose for CE), "-AF" (General Purpose for China), "-AG" (General Purpose for KC) are not available with a detector unit with transmitter (/DUH, /DUHT, /DUV, or /DUVT).
For these types, order the EJX310A separately according to the model and suffix codes and ordering information shown above.

■ Wiring

● Wiring between the GD80 Detector and the GD802G Converter



*1: The protective ground of the converter should be connected to either the internal grounding terminal or the grounding terminal on the converter housing.
Ground resistance: 100 Ω or less.

*2: Added when Digital Communication "-E" (Modbus TCP/IP (Ethernet)) is selected.

*3: Added when Digital Communication "-R" (Modbus RTU (RS485)) is selected.

■ Inquiry Specifications Sheet for GD80, GD802G

Please check (✓) the applicable items and fill in the blank fields.

1. Customer Information

Company name; _____
 Contact Person; _____ Department; _____
 Tag No.; _____
 Plant name; _____
 Measurement location; _____
 Application; ☐ Monitor, ☐ Control, ☐ Alarm, ☐ Custody Transfer, ☐ Other
 Application Description; _____
 Measured Parameter; ☐ Density, ☐ Specific Gravity, ☐ Molecular Weight, ☐ Concentration, ☐ Other
 Measurement Range; _____
 Document; ☐ English, ☐ Japanese

2. Utilities and Installation Conditions

Power Supply ☐ ___V AC ___% ___Hz ___%
 Instrument Air Pressure ___kPa
 Distance from Sampling Point to Analyzer ___m

3. Process Conditions

Gas Composition

Gas Composition	Concentration (vol%)		
	NOR	MAX	MIN
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Gas Sample Pressure kPa
 Gas Sample Temperature °C
 Dust Concentration g/m³
 Moisture ☐ ___vol%, ☐ Saturated at ___°C
 Corrosiveness ☐ None, ☐ Present

4. Installation Conditions

Ambient Temperature Max___°C Min___°C
 Corrosive Gas ☐ None, ☐ Present
 Vibration ☐ None, ☐ Present
 Installation Location ☐ Indoor, ☐ Outdoor
 Communication ☐ Analog
 Digital ☐ Ethernet (Modbus TCP/IP)
 ☐ RS485 (Modbus RTU)

5. Additional Notes

6. Quotation Scope

Item	Qty	Remarks
GD80 detector		
GD802G converter		